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ABSTRACT

The basic mechanical functions of the foreign language laboratory described in this report enable utilization of authentic target language, linguistically effective learning devices, visuals, and facilities for monitoring and testing. Brief descriptions of 11 laboratory functions include: (1) isolation (physical, acoustical, and psychological), (2) program (lesson) presentation, (3) distribution system (switching program to students), (4) student record, (5) monitor, (6) intercommunication, (7) all-call and program call, (8) visual displays, (9) testing equipment (automatic monitor, automatic multiple-choice testing device), (10) supplementary devices, and (11) administrative imperatives for realizing laboratory potential. A selected bibliography is provided. (RL)

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Number 14

The Mechanical Potential of the Language Laboratory

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THE MECHANICAL POTENTIAL OF THE LANGUAGE LABORATORY

The educational function of the FL laboratory is to enable the student to intensify and systematize his practical experience in the target language. Authentic materials of the spoken language are programed to provide active (speaking) as well as passive (listening) practice. In addition, techniques for efficient use of the laboratory for teaching the graphic aspects of language are available. The laboratory provides specialized electronic and mechanical equipment (principally tape recording, playback, and distribution equipment) to present the materials to the student, and to provide a means of correction and evaluation of the student's performance. The materials themselves must be carefully structured with regard to logic, hierarchy order, machine capabilities, consistency, correlation with classwork and the text used, and psychological considerations.

The FL laboratory deals fundamentally with the spoken language, using magnetic tape recordings of native speakers for exercises in hearing and articulation of the target language. Basic materials consist mainly of systematic pattern drills. Early drills are necessarily fragmented, and consist of imitation of isolated sounds and syllables, discrimination between pairs of similar sounds, production of short phrases and sentences. The ultimate aim is to draw the student ever closer to the use of the target language in its relationship to actual life situations, especially as they exist in the culture of the FL area studied.

Cultural considerations reveal the value of incorporating visuals in laboratory drills. Visuals provide a minimal context for utterances in the FL, increase interest and motivation on the part of students, and enable the programer to give his drills relevance and continuity based on pictorial material. Such visuals bring the use of the target language one step closer to real life, provided the pictures are well-chosen, authentic, culturally correct, interesting, and germane to the material being drilled. They represent an advance over the basic pattern drills which (out of necessity) are often abstract and in disconnected form.

The process of producing effective audio and audio-visual programs for the FL laboratory is beyond the scope of this paper, but it should be well noted that the success of the laboratory in accelerating students' proficiency in handling the target language depends primarily upon the excellence of the program. Unless the laboratory program ("software") is well made, the laboratory with all its sophisticated electronic equipment ("hardware") is useless. It is the same principle upon which modern computers operate: without the "software" - or program - the "hardware" has no useful function. What follows in this discussion is an indication of the mechanical potential of the FL laboratory. Only by careful selection and judicious utilization of materials can the teacher expect to realize the potential of this powerful teaching tool.

LABORATORY FUNCTIONS

The equipment which provides the major functions of the FL laboratory is customarily classified in the following groups:

1. Isolation (Physical, Acoustical, Psychological)
2. Program (Lesson) Presentation
3. Distribution System (Switching program to students)
4. Student Record
5. Monitor
6. Intercommunication
7. All-Call and Program Call
8. Visual Displays
9. Testing Equipment (Automatic Monitor, Automatic Multiple-Choice Testing Device, etc.)
10. Supplementary Devices
11. Administrative Imperatives for Realizing the Potential

The degree to which these basic functions are available, and the ease with which they may be achieved, depends upon the equipment manufacturer's original design for his system, and on the installers. It depends also on the degree to which the teaching staff has been involved in the planning of their school's particular lab system. The laboratory may be designed to carry out all or most of the mentioned basic functions, along with other peripheral, and sometimes even questionable, functions (such as "annunciator buttons," by which the student may light a light and/or ring a bell on the console to signal his need of help). Indeed, many laboratories contain functions resulting from very unusual concepts of possible uses. But unnecessarily complicated labs suffer not only from disuse and high initial cost of these functions, but also from increased breakdowns caused by needless complication of the wiring and electronics themselves. Each of the Equipment /Function groups above will now be described briefly:

1. Isolation (Physical and Psychological)

This special function separates permanent laboratories from substitute or "part-time" labs and from electronic classrooms. The room itself and the student stations are designed to effect this isolation. Students are seated in individual carrels (or "booths"), physically separated from their neighbors by partitions. The room itself is acoustically treated to reduce noise and make it easier for each student to work with minimum distraction from the sounds or view of others. Psychologically, it is believed, the student who "feels" alone will perform without inhibition, since he is unobserved and therefore not subject to criticism or ridicule. On the technical side it is important for the student to hear his lesson as clearly as possible. The insularity of the booths helps to minimize total room sound and visual distractions.

Other advantages accrue to the permanent laboratory, such as permanent installation of sound sources, tape library, and other equipment that must, in the laboratory substitute, be carried about.

2. Program Presentation

The primary function of any laboratory (or laboratory substitute) is to provide the means for the student to hear and to work with his audio lesson. Pattern drills, selected readings, and other suitable materials are recorded on magnetic tape. These tapes are assigned numbers (just as books in the library have numbers), and students are assigned certain tapes as part of their course work. There are two major approaches, generally speaking, for presenting to the student his audio lesson. One way is to make a copy of the lesson tape available to the student for his own independent study. This, as a basic way of operating a laboratory, is referred to as the "library" system. Naturally, to make the library system possible, the student must have access to a tape machine, which may be located in his student booth, or in a remote cabinet but controlled from the booth.

The other means for getting the lesson to the student is to play the lesson tape from a tape machine located at the teacher's control desk. The control desk is called the console, and each tape machine mounted therein is referred to as a program source. A motion picture projector, videotape player, or other device might also serve as a program source. (A phonograph record player is sometimes mounted in the console to serve as a program source also: however, it is much better practice to record phono discs onto tape, then play the tape to the students, since phono discs deteriorate rapidly in quality from frequent playings, while tapes do not.)

When the lessons are played from the console to all or part of the students in the laboratory this is known as "console" or "group" operation, and the laboratory is called a broadcast laboratory. One recently popular variety of broadcast laboratory is known as the "dial" or "pushbutton" laboratory. A special room is needed to accomodate banks of automatic tape decks, containing master tapes for many different lessons. The student connects himself to the proper tape by dialing the code number of the required tape (taken from a directory or assigned by the teacher). Remote-control and dial access laboratories require far more expensive and complicated machinery and electronics than other laboratories. They are complicated to install and maintain. They lack facilities for individual control of playback and repeat function of lesson segments; all students connected to a given dial-lab channel must work in "lockstep." Furthermore, if one student has already dialed a certain tape, the next student who dials it will find himself somewhere in the middle of a drill whose careful structuring is then lost to him.

Generally it appears that simple console distribution with a limited number of channels is more effective than a multiplicity of channels with the dial system. If great flexibility is needed, the library system (with a tape player at each booth) fills the requirement, allows individuals to play and replay any part at any time, and costs less than an automatic laboratory.

There is also a distribution system in which radio broadcasting is used. This is the "wireless" laboratory. The program is played on a program source and

fed to an antenna installed around the perimeter of the classroom. The students wear headsets incorporating radio receivers and antennae, so that they can hear the tape program without any direct wires. This system is mainly used in classrooms (as substitute laboratories) and does not incorporate many of the basic laboratory functions enumerated in this paper. It particularly suffers from the lack of Monitoring and Intercom functions (5,6).

3. Distribution System

A central program must be directed over appropriate wires to the student who will use it. Switches are used for this purpose. In simple laboratories having only a few sources, these switches may be located on the teacher's control panel at the console. The teacher may then route a program to the whole class, to specific booths by manipulating a switch for each booth ("booth switching"), or to a certain row of booths ("row switching").

When students are to be given more responsibility (as in college), channel selection switches may be located in each booth. The student may tune in to any channel by turning his selection switch to the channel desired. In "dial" or "pushbutton" laboratories the student has a telephone dial or an array of numbered pushbuttons on which he signals the code number of the desired lesson. This activates automatic switchgear similar to that used in the telephone centrals, connecting the student's headset to the appropriate remote tapedeck and starting the tape, if it is not already in motion.

There has been experimentation in the distribution of FL laboratory programs to student dormitory rooms via a telephone system. The student, in his room, may dial the laboratory and the number of the channel desired. He will then receive the designated program over his phone. Since telephone-quality sound is far below the acceptable limits of sound reproduction for language study, the great expense of this system does not seem justified. The personal presence of the student in the laboratory, where supervision and high-quality sound are available, seems preferable and far less expensive.

4. Student Record Function

Student Record Function ("student record") is an optional laboratory function. It enables the student to record his responses to audiolingual drills, and then to replay all or part of them at any time. He hears his utterances juxtaposed with the native speaker's answers on the tape. This permits him to make an objective evaluation by comparison, and to undertake remedial work immediately. The teacher may also review a student's tape in consultation with him, pointing out difficulties and giving correctional assistance.

Mechanically, the student record function requires a tape recorder for each student booth so equipped. (sometimes the recorder is remotely located, with only the controls in the student booth.) Because of the increased cost of the recording equipment, some schools provide this function in just one row of the laboratory booths (or 10-20% of the booths). Electronically, the student automatically records as he responds to the drill, and it is impossible for him to erase the master

(lesson) track of the tape. The student usually has complete control of the record and playback functions for his own voice, and may stop and replay his own performance at any time.

Pedagogically, the effectiveness of student recording has been neither firmly established nor disproven. Unless a student has been carefully trained to discriminate between sounds of the FL and the native language, his comparisons may not be accurate. However, if the students have been given careful grounding in basic sounds and sound production during the early stages of instruction, the probability for successful self-evaluation and correction is greatly improved.

Within the profession controversy has raged for years between those who are in favor of having a recorder for each student and those who are opposed to it. Those opposed argue that the student is not able to evaluate himself objectively, that, furthermore, his hearing himself may even be harmful (he may be overlearning his own mistakes), and that therefore the significant additional cost of the individual recorder is not justified.

Most proponents will concede, as pointed out above, that careful preparation is necessary for the student to evaluate himself. It is also true that it is not necessary - or even desirable - for the student to record and evaluate himself every lab period. But all the discussion of student self-evaluation misses entirely the basic benefit of student record, which is true individualization of instruction - the student has the lesson to himself. He therefore is provided the opportunity to practice what may most greatly benefit him individually, irrespective of other students' activities. And this advantage accrues to each and every student in the lab when each has a recorder. Many different students may be practicing different lessons, or the same lesson in different ways, but still under the supervision of the teacher.

5. Monitoring

Monitoring is the supervisory and evaluative capability provided to the teacher by special switches at the console. Each student is represented on the console by a monitoring switch enabling the teacher to listen in to his performance. The switches should be designed to operate without any click, drop in volume, or other indication to the student that he is being monitored. Thus the teacher may hear the student's typical performance, and the student will not be alarmed by knowing that he is being evaluated at that moment.

Evaluative monitoring may be easily accomplished by bringing an entire class to the laboratory. A selection of tapes recently assigned as homework is broadcast on a single channel, and all students respond according to the regular procedure used on the tapes. Since they have had previous class instruction and opportunity to practice with these same programed tapes, the teacher may hear the results of planned and systematic practice.

During the monitoring session the teacher listens to the students (in turn) for a few utterances, then goes around the class again, listening as often as possible to each. On the average, each student is graded on 5 to 12 utterances in the

course of a 50-minute monitoring session. While the teacher is evaluating individual students, all students are getting a solid block of intensive practice. During the semester a student's laboratory monitoring grades may be recorded, and will then collectively comprise the grade for speaking proficiency for the semester, taking the place of a special final examination.

Monitoring, in my definition, refers primarily to such graded performance and is an integral part of all courses using laboratory materials. Monitoring takes place after students have had practice in class and in the laboratory using the same materials. It is possible, of course, to use the monitoring switch merely to listen in to students practicing without grading taking place; the purpose of this is ostensibly to give remedial advice to students using incorrect techniques or making mistakes consistently. Generally it is not advisable to interrupt a student during a drill, because this causes the student to lose his bearings with relation to the structuring of the pattern drill. If a class is brought to the laboratory simply to practice pattern drills, and test-monitoring is not contemplated, the teacher should merely make notes of errors and of corrective measures for each student, to be given to him at the end of the lab session. At all events the teacher should be occupied with monitoring at the console so that students will be motivated to perform well and continuously.

It is a welcome relief to allow breaks of two or three minutes during which students may remove their headsets. This break may occur at the end of a drill segment, and the teacher may use it for a critique, mentioning errors frequently observed, or may give the class a brief remedial drill "live."

Arrangements for laboratory use are the responsibility of the teacher. Prior planning here is just as important as in other class preparation. The laboratory must be reserved for the class, tapes selected and (perhaps) dubbed onto a composite monitoring tape, seating chart prepared and posted, and laboratory personnel informed in advance of the equipment needed and programs to be set up and cued for immediate use. Students should not be required to sit idle in the laboratory while tapes are threaded or other tasks performed that should have been completed prior to their arrival.

6. Intercommunication ("Intercom")

The "intercom" provides a private channel for two-way conversation between the teacher and one selected student. An intercom switch is located on the control panel at the console, usually an additional position of the monitoring switch for each booth. When the teacher operates this switch for a particular student, the teacher and student may talk to each other without interference. The program (or individual tape) is muted automatically to allow the teacher's voice to dominate. Even so, the student should stop his tape (if he is using one) during the conversation.

Because of the disruptive nature of such conversations upon the progress of a student through the structured pattern drill, use of the intercom should be sparing. Only instructions of great urgency are justification for its use: correction of gross errors of procedure (the student is not using the material in the prescribed manner), intolerable linguistic difficulties that require immediate

correction, or personal business that takes precedence over the language work. Young or inexperienced teachers should be cautioned against over-use of the intercom, since more harm than good may result from the disruption of the hierarchic organization and structuring of exercises.

7. All-Call and Program Call

The all-call switch instantly connects the teacher's microphone with all booths in the laboratory, at the same time disconnecting the students from whatever program or tape they are using. It is used for general announcements: a change of channels, the end of a period, the closing time of the laboratory, and other administrative remarks.

The program call switch instantly connects the teacher's microphone to all booths "tuned in" to a particular channel. This enables the teacher to make an announcement to a specific group of students in the laboratory without interrupting any others. When the teacher has his class in the laboratory using (e.g.) Channel 3, and other students are working in the laboratory, the program call for Channel 3 enables him to talk to all members of his class, and only those. Other students in the laboratory would not hear the announcements. (If the teacher's class only were in the laboratory, the all-call would probably be used.) In short, the program call is used for announcements of interest to only one group of students in the laboratory. As with the all-call, student programs on the designated channel are muted during the announcement.

8. Visual Displays

The learning process is enhanced when it is possible to incorporate visual materials. A permanent laboratory has projectors and associated equipment always in place ready to operate. The sound may be channeled to the students' headsets. This makes the use of visuals much more convenient than in situations where projectors and recorders must be carried about from room to room and installed anew for each use.

It is still difficult to obtain or produce appropriate visual programs. The most common media for visual displays are filmstrip and automatic slide projections (both with synchronized audio and pulses for advancing to the next picture) and the motion picture. Videotape recorders are experimentally in use in some well-equipped and well-budgeted institutions.

The motion picture can be profitably used in the FL laboratory. Instead of using a loud speaker for the sound, as in an auditorium, the sound is routed over a laboratory channel to the students' headsets. This enables all students to hear the sound track with equal clarity, an impossibility when loudspeakers are used and students are at different distances and angles from the speakers. Some language-teaching films require student responses. In a classroom or auditorium these responses are lost in a general roar of sound, but they are susceptible to individual monitoring when the film is used in the laboratory. Each student hears the sound in his headset and speaks into his microphone, thus enabling the teacher to switch from one to another and evaluate individual responses.

A caveat must be inserted with regard to materials for visual presentation: the preparation of good programs is a long and arduous task. Collecting the necessary pictures is in itself a large logistical and editorial job; preparing a tapescript in programed form which provides for foolproof student response is another separately difficult assignment, as it is with pattern drills of the strictly audio type; recording, editing, and pulsing the tapes are additional things to be done when the pictures have been put into the form of slides (or whatever) and correlated with the order of presentation of the audio. When possible, publishers' materials are reviewed and used, because the classroom teacher rarely has the time, experience, or excess time and energy needed to produce audiovisual programs.

As with all laboratory materials, programing is the critical problem. Techniques for making satisfactory audio tapes have been developed; the making of good audiovisual linguistic software is still rare, and a dearth of materials exists.

9. Testing

The FL laboratory affords excellent facilities for testing, both in spoken and written form. Monitoring provides evaluation of speech production; other techniques permit testing of comprehension, writing, and reading. Whenever visual (pictorial or printed) components of questions are used, the laboratory has the capability of presenting the visual automatically synchronized with the speech. Multiple-choice items (which predominate in such manuals as Robert Lado's Language Testing) are easily presented and can be scored automatically.

(a) Listening tests. The material of a listening test (whether simple phonemic discrimination or comprehension of a short anecdote) is first prepared in script form. The method of indicating answers is determined (such as an IBM multiple-choice answer sheet), and visuals are cued in. The audio tape is recorded and edited, and pulses for projectors placed on the tape.

Typically the student listens, selects an answer from the display, and indicates his choice. The answer display may be printed, projected on a screen, or spoken on the tape.

Hearing tests are used for phonemic discrimination (telling the difference between two sounds), vocabulary (e.g. identifying an item whose picture is projected), word order recognition, tense recognition, comprehension of statements, and recalling details of an anecdote given orally. (See Lado for many suggestions.)

(b) Speaking tests. The student may be asked to respond aloud to questions, to participate in a pattern drill, to identify simple pictorial representations aloud, to make a simple statement about a "situation" depicted on the screen or in a test booklet. He may, on a more advanced level, compose an oral narrative based on a projected or printed picture.

In all cases, the student must be heard at length if his speech is to be evaluated. The laboratory is usually equipped to record all his answers, and his tape must

later be heard and graded. This unfortunately obviates short-cut methods of grading that are possible with other kinds of tests (multiple-choice). It is therefore advisable to make such tests quite short: 5 minutes should be enough for the purpose. (Multiply the length of the test by the number of students to see if you have enough time for grading: 60 students x 5 minutes = 300 minutes, or five hours time required to hear and grade the sixty tapes. Time must be added for mechanics of threading tapes and for paperwork. (See Valette for scoring criteria.)

This problem may be eliminated by periodic monitoring during the semester. The cumulative grade on monitoring may serve as the grade for speaking.

(c) Writing tests. The laboratory may be used for parts of examinations involving writing only. The booths provide good isolation. In addition, visual and audio dimensions may be imparted to the writing task: a "situation" picture may be projected, and the student asked to write a composition describing it, giving evidence of good structure, vocabulary, spelling, punctuation, and style.

Dictation tests are simple to administer in the laboratory, because the sentences dictated may be heard with equal clarity by each student through his headset, unlike the diverse hearing conditions in the classroom. Moreover, repetitions of the test are exact duplicates of the original; every class of students in a course hears an identical dictation.

(d) Reading tests. When "reading" means the ability to articulate printed words, it may be tested simply by having students read aloud from printed sheets, books, or from sentences projected on the screen. Indeed, reading practice is better done in the laboratory than in the classroom. All students start reading aloud and continue on until the teacher has monitored each one and assigned a grade. In this way the whole class benefits from protracted practice in reading, while grades are assigned to individuals by the teacher. (Compare this with the classroom where one person reads while all the rest are passive.)

Reading silently for comprehension can be combined with audio comprehension. The test tape instructs the student where to begin reading and gives the beginning and ending signal for silent reading. Comprehension questions on content may then be given orally or in writing. The student answers in writing or by multiple-choice responses.

(e) Automatic multimedia devices. Automatic testing machines (e.g. Edex) can present a complete test using a standard 1/4" recording tape containing all the spoken parts and (on a separate inaudible track) signals (pulses) to turn projectors on and off, advance pictures, tabulate student responses to multiple-choice questions, provide immediate item analysis data, and produce a printed read-out of total scores and individual item responses for each student. Scores are visible at the very moment the test is ended. Students are provided with a multiple-choice "responsor" in each booth, and by pressing the appropriate button (A, B, C, D, E) they indicate their selection which is automatically tabulated and scored instantaneously. (Details of this are in Stack, pp. 196-206.)

10. Supplementary Devices

(a) Automatic Instant Replay. This is a device for immediate playback of a student response to a pattern-drill stimulus. When activated, this device at once replays the student utterance so that he may compare his articulation with the master. It is a way of doing automatically what has always been possible by stopping the tape, rewinding for a second, switching to "play," and moving the tape forward again.

The device is an expensive convenience, and its value lies in the degree of usefulness seen in having the student hear what he has just said. The value of this has neither been proven nor disproven.

(b) Automatic Response Accumulator. This device records answers only (not questions) from all students during examinations. It is made to stop student recorders while questions are presented and to start them during answers. At the end of the examination, the instructor starts the accumulator, and all student answers, with name identification, are re-recorded on a single tape. This greatly simplifies the administration and grading of speaking tests. It is also a very expensive convenience.

11. Administrative Imperatives for Realizing the Potential

Among the additional functions of the laboratory are:

(a) Tape library. In library-tape laboratories student tapes are shelved and classified for issue to students. These tapes are used on individual tape decks at the student booths and consist of lessons correlated with their text or of supplemental materials (lectures, newscasts, plays, poems, etc.). Master tapes are stored separately for the use of teachers and technicians only. A card catalogue is maintained for ease of location of tapes.

(b) Recording studio. Recording facilities are maintained to prepare tapes and programs.

(c) Administrative system. A simple administrative system is maintained for scheduling teachers' classes in the laboratory, assigning assistants to duty, preparing the payroll, requisitioning supplies, maintaining equipment, ordering changes and improvements. A Director is ordinarily designated for this purpose.

(d) Maintenance. Daily and weekly maintenance services are performed by laboratory assistants (cleaning headsets, cleaning and demagnetizing the tape heads on recorders, etc.). Electronic repairs are done by qualified contract personnel or skilled assistants.

(e) Stocks of tapes. Library copies of tapes ordered by teachers must be prepared systematically. Inventory of blank and recorded tapes is kept.

(f) Training. Newly recruited laboratory assistants are given on-the-job training by assignment to work with experienced ones. A detailed checklist of

skills, functions, and jobs is given each trainee, and he is eventually tested rigorously on each item. Advances in responsibility and pay depend on his training and proficiency.

(g) Student orientation. At the beginning of each semester, an orientation is given every class containing students without previous experience in the use of the laboratory. Classes are brought to the laboratory, where they learn how to operate the equipment, how to find out what tape is assigned, how to draw tapes from the library, and other details of the laboratory routine. The mechanics of pattern drills are also explained and exemplified, so that the students will know precisely what they are expected to do. This whole demonstration may be automated using an orientation tape and synchronized visual display.

(h) Teacher orientation. Teachers should be thoroughly apprised of the laboratory operation and especially of the correlation of classroom work with the laboratory. They are shown correct procedures for ordering tapes, preparing materials, reserving the laboratory for their class, preparing seating charts, and techniques for monitoring (grading).

Summary

Whatever the size or configuration of the FL laboratory, its basic functions enable the student to hear the target language spoken authentically, systematized to take advantage of the most useful linguistic devices for learning, including visuals and facilities for monitoring and testing. Careful program preparation is the key to success. The laboratory is capable of affording greatly intensified and economical practice to the student and of providing the teacher with additional useful tools for teaching and testing.

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